Claim 1, 2 and 4 are pending, and these have been finally rejected on both formal and prior art grounds.

# **Formal Grounds**

The specification has been objected to under 35 USC 132 because "or irregular" on page 3, line 19 introduces "new matter into the disclosure of the invention." This objection is repeated as a rejection of claims 1, 2 and 4 under 35 USC 112, first paragraph because claim 1 recited "non-regular".

This objection and rejection are respectfully traversed.

The metallic foils according to the present invention serve as current collectors in, for example, a lithium secondary battery or a lithium-ion battery. The foil desirably has holes (penetrating holes) which penetrate the foil. The hole can have a smooth surface defining its perimeter or it can have a surface which is not smooth. The term used to describe the "not smooth" surface was originally "complicated." This term was found by the examiner to be objectionable because "[c]omplicated generally means difficult and it is unclear what a complicated or difficult shape encompasses." (Page 4, of the Office Action of October 7, 1999.). To overcome the objection, "complicated" was modified in the specification to "complicated or irregular," and to "non-regular" in claim 1. These modifications, it was believed, would clarify any confusion, which apparently it did not. Still, the condition of "irregular" or "non-regular" is, it is respectfully submitted, clearly shown in Figs 1 and 2, even if it is found nowhere else.

The examiner in the latest Office Action takes the position that "or irregular" in the specification is objectionable, and "non-regular" in claim 1 is rejectable. This leaves applicant with no place to go, except back to "complicated," since, presumably, the illustration in Figs 1 and

2 is not supportive, which in fact they are.

Also, the term "complicated" means more than that which the examiner expresses as her understanding. The term "complicated" could mean "difficult" as suggested by the examiner, and such a meaning would not lend much to and understanding of the surface under consideration. However, "complicated" also means "having many interconnected parts," or "marked by an interrelation of diverse and often numerous parts..." (Webster's Third New International Dictionary, page 465, copy enclosed). Considering these definitions, lends more meaning to the concept of the shape of the surface defining the holes. Couple this with Figs. 1 and 2 and, it is respectfully submitted, no confusion should exist.

It is respectfully submitted, therefore, that the term "complicated" should be accepted if "irregular" is not. In either case, those skilled in the art should have no difficulty in understanding what is intended.

Claim 4 has been rejected as indefinite under 35 USC 112, second paragraph, because it is incomplete since "essential steps" have been omitted according to the examiner. This rejection is respectfully traversed.

To understand claim 4, reference is made to Japanese patent 3-13926. A copy of this patent and an English language abstract are being submitted herewith. Note Fig. 2 of this patent which shows the roll 3 penetrating the foil 1 to form holes. The roll 3 corresponds to a concavo-convex roll like that used in the present invention. All that is needed is rotation if the roll is configured as a concave-convex roller.

As to what a "given pressure" is, it is a pressure sufficient to produce a hole. Still, as suggested by the examiner, claim 4 has been amended to change "under a given pressure" to

"under pressure."

# **Prior Art Grounds**

Claims 1, 2 and 4 have been finally rejected as unpatentable 35 USC 103(a) over Jenkins et al. This rejection is respectfully traversed.

Claim 1 defines a current collector with very specific parameters, namely, two equations which must be satisfied to define the surface shape of the penetrating holes. If these equations are not disclosed in Jenkins et al, it is not seen how Jenkins et al can render claim 1 unpatentable. Jenkins et al has no reason to even contemplate the noted equations, because their holes do not have a complicated or irregular shape. Nor is it proper to suggest that Jenkins et al would contemplate the two equations because they are made with a punch die and not a concavo-convex roller.

A reference which teaches a plate with punched holes is not sufficient, it is respectfully submitted, to render a foil with a plurality of penetrating holes satisfying two specific equations, obvious.

Regarding claim 4, it is the convex parts that create the penetrating holes, and the penetrating holes are those defined in claim 1. Claim 4 is therefore a product-by-process claim and as such enjoys the distinctions noted above relative to claim 1. Jenkins et al cannot render claim 4 unpatentable in the same way that it cannot render claim 1 unpatentable. Also, Jenkins et al does not teach the step of passing the metal foil with the penetrating holes formed therein "further through between a pair of metal smoothing rolls" for the purpose of de-burring the penetrating holes at their periphery.

In view of the foregoing, reconsideration and re-examination are respectfully requested and claims 1, 2 and 4 found allowable.

Respectfully/submitted,

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December 1, 2000

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competent fixation n: the absorption of complement to the compound formed by the union of an antibody and the after which it is specific occurring when complement is to a mixture (in proper proportion) of such an antibod antibod antibod antibod mixture (in proper proportion) of such an antibod antibod mixture (in proper proportion) of such an antibod antibod mixture of known antigen and a serum suspected to contain the specific antibody for this antigen and used esp. in the diagnosis of syphilis — see wassermann Test complementing pres part of ComPLEMENT Complementing pressential pressure to the complement of complementing pressure to the complementing pressure to the complement of complementing pressure to the complement of complementing pressure to the complement of complementing pressure to the complementing p

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complete solution n: GENERAL SOLUTION complete stop n: a set of organ pipes extending throughout the compass of the manual completion. completio filling, fr. completus (past part. of complère to complete) + configue to complete. The completion of the late artist's unfinished masterpiece): specifi : a forward pass caught by the receiver (out of 10 attempted passes, there were 5 ~ s) 2: the quality or state of being complete: FULFILLMENT (his desires having reached ~) completion test n: an intelligence test requiring that the one to be tested complete a whole (as a sentence or picture) from which certain parts have been omitted completive kem'pléd-iv adj [LL completius, fr. L completus + :tws -ive]: serving or tending to complete (annotations ~ of the test); specif, of a verbal aspect: expressing completion of an action — completive-1 y-d-avie\ adv | completo-1 y - d-avie\ ad

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complex variable n: a number or expression of the form x+i

where l=√-1 and x and y are in general variables complex variable n: a number or expression of the form x+iy where l=√-1 and x and y are in general variables com-pli-able \kam'pliobol\ adj [comply + -able] 1 archaic : disposed or apt to agree or yield : COMPLIANT 2 obs : that may be reconciled - Com-pli-ably \oldsymbol\ ble adv com-pli-ance \kam'pliant(t)\s\ n -s [comply + -ance] 1 obs a : CIVILITY b: friendly or happy agreement : HARMONY, CONCORO (~ between man and wile) 2 a: the act or action of yielding to pressure, demand, or coercion : CONFORMANCE (the Counter Reformation was not a ~ with Reform but a defiance of it —H.R.Trevor-Roper) b: inclination or readiness to yield to the demands of others often in a service or spineless fashion (worthy men may be rejected because of their very virtues and unworthy men selected because of their ~ P.H.Douglas) 3: the quality or state of yielding to bending under stresses within the elastic limit; also: the amount of displacement per unit of applied force 4 a: conformity in fulfilling formal or official requirements & letter written in ~

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# JP3-13926

TITLE: Manufacture of perforated metal plate

ABSTRACT: To obtain a perforated metal plate without generating a material loss by making a hole by a roll having a lot of projection, turning back its return by a scratching jig, and thereafter, executing a rolling by a roll.

As for a perforating roll 3, a projection 2 is provided in a line in the circumferential direction and the width direction,

A metal plate 1 is fed continuously between the roll 3 and a recieving roll 11. A hole 4 is made by the projection 2, and a return 6 is cut and raised. The metal plate 1 is fed continuously and the return 6 hits against the tip of a scratching jig 5. The return 6 is turned back, and thereafter, rolled by a rolling roll 7. The metal plate 1 is rolled thinly and elongated, and also the return 6 is allowed to gnaw as one body with the metal plate 1, and a perforated metal plate having no burr is obtained. Since there is no punching dust, no material loss is caused, and no burr is generated, therefore, this metal plate can be handled easily.

®日本国特許庁(JP)

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許 公 報(B2) ⑫特

平3-13926

®Int. Cl. 5

識別配号

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200公告 平成3年(1991)2月25日

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28/12 31/02 35/00

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発明の数 1 (全3頁)

孔明き金属板の製造方法 の発明の名称

半 昭62-7741

顧 昭58-249601 20特

**❸**公 開 昭60-133936

223出 願 昭58(1983)12月23日 @昭60(1985) 7月17日

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**奥公 昭42-15992(JP, Y1)** 网参考文献

1

## 動特許請求の範囲

1 金属板を連続的に送つて多数の突起を有する 孔明けローラにて孔を明け、次いで引つかき冶具 にて孔を明けた返りを折り返し、次いで圧延ロー に亘つて均一な厚さにすることを特徴とする孔明 き金属板の製造方法。

## 発明の詳細な説明

### [産業上の利用分野]

き金属板を連続的に製造するのに用いる技術に関 するものである。

#### 「従来の技術」

従来、金属板の全面に多数の孔を明ける場合、 打ち抜き屑が出て打ち抜き屑の分だけ材料ロスと なり、また打ち抜いたときばりができるという欠 点があつた。

## [発明が解決しようとする課題]

て、本発明の目的とするところは材料ロスなく確 実に孔を明けることができると共にばりが出ない 孔明き金属板の製造方法を提供するにある。

## [課題を解決するために手段]

連続的に送つて多数の突起2を有する孔明けロー ラ3にて孔4を明け、次いで引つかき治具5にて 孔4を明けた返り6を折り返し、次いで圧延ロー ラフにて圧延して返り6を金属板1に食い込ませ ラにて圧延して返りを金属板に食い込ませて全面 5 て全面に亘つて均一な厚さにすることを特徴とす る。

## [作用]

金属板 1 に孔 4 を明けるとき本来打ち抜き屑と なる部分を返り8として形成し、この返り6を孔 本発明は金属板の全面に多数の孔が明いた孔明 10 4以外の部分に折り返して返り6を圧延にて金属 板1に食い込ませることができて、打ち抜き屑を なくして材料ロスなく孔明き金属板 8 ができる。 [実施例]

3 は孔明けローラであつて、外周に多数の鋸歯 プレス等による打ち抜きによつて行つていたが、15 状の突起2を周方向及び幅方向に列設してある。 つまり第1図に示すように外周に鋸歯状の突起2 を周方向に全周に亘つて設けたものを幅方向に適 当な間隔を隔てて複数列設けてある。この孔明け ローラ3の上方には孔明けローラ3と平行にゴム 本発明は叙述の点に鑑みてなされたものであつ 20 ローラのような受けローラ 11を配置してあり、 孔明けローラ3と受けローラ11を転接させてあ る。孔明けローラ3及び受けローラ11の両端の 軸は夫々軸受け板12に回転自在に支持してあ る。この受けローラ 1 1 の前方(金属板 1 の進行 本発明孔明き金属板の製造方法は、金属板 1 を 25 方向を前とする)には引つかき治具 5 を配設して

あり、この引つかき治具5は断面菱形状に形成さ れ下端が鋭角に尖つている。引つかき治具5の下 方には金属板 1の板厚の隙間を介して受け台13 を配置してあり、受け台13の両端を引つかき冶 具5の両端を連結板14にて連結してある。この 5 引つかき治具13の前方には一対の圧延ローライ を上下に配置してあり、圧延ローライの両端の軸 を軸受け板15に回転自在に支持してある。

孔明き金属板8を製造するにあたつては、孔明 けローラ3の手前から鋼板、アルミニウム板、銅 10 板等の金属板1を連続的に送り、金属板1を孔明 けローラ3と受けローラ11との間に供給する。 すると回転する孔明けローラ3と受けローラ11 との間で第2図に示すように突起2にて金属板1 と共に各孔4に孔4を明けたための返り6が第3 図に示すように形成される。金属板 1 に孔4を明 けるとき金属板 | が第4図に示すように孔明け口 ーラ3と受けローラ11との間を通過し、孔明け ローラ3の突起2に対応する部分だけ受けローラ 11が弾性的に凹んでスムーズに孔4が明けられ ると共に返り6が形成される。孔4を明けた金属 板1はそのまま連続的に送られて引つかき治具1 3と受け台13との間に供給され、引つかき治具 示すように返り6が折り返される。次いでこの金 属板 1 が一対の圧延ローラ 7 間に供給されて圧延 される。すると、第6図に示すように金属板1が 薄く圧延されて伸びると共に返り6が金属板1に 一体に食い込みばりのない孔明き金属板8が形成 30 される。この孔明き金属板8は全体が帯板状であ り、全面に亘つて上下に貫通した孔4が形成され ており、例えば第7図に示すような樹脂被覆金属 板 9 の芯材として用いられる。樹脂被覆金属板 9 を形成する場合、押し出し成形機等で孔明き金属 板8の両面の全面に亘つてポリ塩化ビニルのよう な合成樹脂 10が被覆される。この樹脂被覆金属

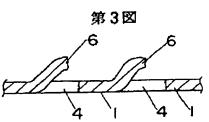
板9を形成したとき両面の合成樹脂10が孔明き 金属板1の孔4を介して一体につながり、両面の 合成樹脂 10 が孔明き金属板 8 の両面に強固に密 着し、合成樹脂 1 0 が剝離しない樹脂被覆金属板 9が得られる。このようにして形成された樹脂被 覆金属板 9 は帯板状である。この樹脂被覆金属板 9 は適当なの長さに切断して建築板として用いた り、また樋伏の折り曲げ加工して雨樋として用い たり、その他の種々の用途に用いたりできる。

# [発明の効果]

本発明は叙述の如く金属板に孔明けローラにて 孔を明け、引つかき治具にて孔を明けた返りを折 り返し、圧延ローラにて圧延して返りを金属板に 食い込ませて全面に亘つて均一な厚さにするの の長手方向及び幅方向に多数の孔 4 が明けられる 15 で、確実に孔が明くのは勿論、孔明けにより生じ た返りを金属板に食い込ませてこの返りの材料分 だけ余分に金属板を展延できるものであって、打 ち抜き屑が出ず返りを有効利用して材料ロスをな くすことができるものであり、しかもばりが出ず 20 次工程での取り扱いがしやすいものであり、さら に圧延するとき孔により伸びのばらつきをなおし て均一に圧延できるものである。

### 図面の簡単な説明

第1図は本発明方法を実施する装置の斜視図、 5 の下端である先端に返り 6 が当たつて第5 図に 25 第2 図は同上の金属板に孔明けローラにて孔を明 ける状態を示す断面図、第3図は同上の孔明け口 ーラにて孔を明けた状態の断面図、第4図は孔を 明けるときの孔明けローラと受けローラの状態を 説明する断面図、第5図aは同上の返りを折り返 す状態と圧延状態を示す断面図、第5図bは返り の折り返し状態の断面図、第6図は同上により得 られた孔明き金属板を示す断面図、第7図は尚上 の孔明き金属板に合成樹脂を被覆した状態の断面 図であつて、1は金属板、2は突起、3は孔明け ローラ、4は孔、5は引つかき治具、6は返り、 7は圧延ローラである。



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